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PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

08

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ORIGINAL METHODS. MODERN ACCESS.

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FROM THE ARCHIVE

Venison Study

BY AMERICAN GUNSMITH EDITORS AUGUST 2015

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How much venison do hunters harvest? Every year, some 40 million citizens in the United States and Canada take to the fields, mountains, forests, streams, and lakes, returning with a harvest of wildlife and fish to feed their families and share with friends. Just how much of this natural, organic food do these two nations provide annually? How valuable is it to our societies? At this point, no one really knows.

Venison Study The Dallas Safari Club (biggame.org) is funding a research project and partnering with Conservation Visions, Inc. (conservationvisions.com) to begin a five-year initiative to answer this, which is scheduled to begin this year. This study will measure the actual amounts of venison and other wild protein harvested annually in North America.

Researchers will assess the nutritional, cultural, and economic values of this harvest, as well as the ecological costs of replacing this food through standard agriculture and domestic livestock production. DSC is the founding sponsor of the project, pledging \$200,000 over the next two years. DSC officials hope other sponsors will come aboard to help advance the study. "This research isn't just fascinating.

It's critical to help modern society understand the full scale of hunting on this continent, and of the natural, organic, sustainable food that today's hunters provide for their families," said Ben Carter, DSC executive di-

rector. "Additionally, this research will help all of us understand the hidden costs when hunting traditions are eroded—or attacked." The study, named "Wild Harvest Initiative," will be conducted under the direction of research biologist Shane Mahoney, founder and CEO of Conservation Visions, Inc.

With 40 million citizens in the U. S. and Canada harvesting protein sustainably from natural sources, this study will show just how much wild protein the two nations provide annually, and its real value to our society. "The harvest and consumption of wildlife has been an integral part of the human story throughout the entirety of our existence. Agricultural and technological progress have certainly altered our direct dependence and engagement in this process, but in many regions of the world, including the U.

S. and Canada, human populations continue to rely on wild harvest for a significant part of their diet," Mahoney said. "We've known for well over a century that conservation of the world's ecosystems is critical to human well being and that the sustainable use of wild resources brings enormous and unique benefits to human beings everywhere." Harvest research will enable better understanding of the economic effects of resource management approaches, validate policy and governance structures, and empower best practices for providing sustainable use of wild protein to as many people as possible.

FROM THE ARCHIVE

All About AR-15 Sights

There's more to know about iron sights than you might imagine!

BY JOE CARLOS AUGUST 2015

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One of Bill Clinton's "crowning achievements" was passage of the Federal Assault Weapons Ban. Cosmetically-altered versions of the black gun missing flash suppressors and bayonet lugs were known as "Post Ban" models and those having them were "Pre Ban." While this law expired some states enacted similarly useless laws still on the books. A few shooters found that they liked Post Ban configurations better.

The most common practice for gunsmiths building ARs without flash suppressors is to use front sight housings sans bayonet lug. I have had a few such "mix and match" (or "mismatch"?) examples come in my shop and it doesn't degrade performance either way, though I feel having one but not the other appears tacky. Deal with that as you see fit.

Front Sight Mounting The old school way of mounting a front sight was with taper pins driven in at the factory by gorillas, the way Below center: "Clamshell" front sight housing from the left side. the military still fastens theirs. Unfortunately, this practice has a negative impact on accuracy. Anything done on the outside of any gun barrel can influence the internals, more so

in hammer forged or button rifled barrels which do not cut out the grooves but simply swage metal to form the grooves.

Military M16 barrels are button rifled and the same factories normally hammer forge machine gun barrels. When the taper pins are hard driven in place they tend to constrict the bores of the barrels slightly and bullets passing such constrictions are boogered twice rotating past each pin. Bullets twice deformed on different sides don't shoot accurately.

It's not difficult to remove some of this bore constriction, as described in "Improving Rack-Grade AR-15s" (December 2014.) Because of the justifiable bad reputation tapered pins have earned regarding accuracy degradation, some barrel manufacturers have made an effort to either improve or obfuscate (depending on your point of view) matters by changing to straight pins.

Whether these really deform the internals of a gun bore less is something I have never attempted to quantify but I will say that they are highly suspect. The techniques in my previous article can be modified to work with straight pins. If you are selecting a barrel for serious target shooting I wouldn't use any barrel with a pinned front sight.

These are normally offered by low bid, lower quality barrel manufacturers, starting with a poor quality barrel blank and risking worsened accuracy by pinning the sight in place. On the other hand, if you are building a "minute of tin can" blaster, save money by choosing such a barrel. Another way of fastening front sights is what I calla "clamshell method." The bottoms of both barrel bands are split open and the four holes in the housing normally used with taper pins are drilled.

On the ejection port side of the sight housing holes are tapped for two fairly heavy Allen screws. The bolt catch side of the housing has the holes countersunk to fit the heads of the Allen screws. When those two screws are tightened, the "clamshells" constrict, firmly capturing the barrel and holding the sight in place. I use a simple pointer gauge to approximately center the front sight post initially. There are other ways of doing this that take longer and don't necessarily produce any better results.

The shooter will have to establish zeroes and gunsmiths should just get the gun on paper. An

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Top Far net) front sight adjustment gauge clamped on a preban barrel. On right, a Ray-Vin (ray-vin.com) gauge. advantage to this clamshell design is slightly loosening the Allen screws allows the sight housing to be moved right or left to allow no-wind zero (where the bullet hits when conditions are dead calm) and mechanical zero (where the rear sight is dead center in the middle of its left to right travel) to coincide. MAK Enterprises or Ray-Vin front sight adjustment gauges make this easy.

Note, when initially locating any of these gauges on pre-ban barrels, insure there is a slight gap between the front of the bayonet lug and the Below center: CLE 1-1/4" float tube is easy to access a set screw through the existing hole in the bottom of the rear barrel band. Float tubes sized 1 3/8" require modification in order to access the barrel band hole. clamp on the gauge. Contact between the two will compromise your adjustments.

Once that setting has been accomplished and the Allen screws retightened the barrel bands and Allen screws need to be hit with

Loctite 290 Wicking Grade to "weld" everything in place. A third way is using set screws up through the bottom. Set screws can be placed in either of two places or doubled up for a more secure hold.

All A2 sight housings already have a second hole pre-drilled that was used in turn to drill the hole in the housing that feeds gas up from the gas port in the barrel to the gas tube that is anchored inside the sight housing. That hole in the bottom of the rear barrel band can also be tapped for a set screw. If a sling swivel is attached it will have to be temporarily removed to get to the hole to tap and install the set screw.

After everything is adjusted and Loctite 290 has been applied, replace the original sling swivel rivet and remount the swivel. National Match uppers normally have float tubes to remove sling pressure from the barrel and some of these tubes allow easy access to the rear barrel band pre-drilled hole. The 1 1/4" unit from Compass Lake is an example of user friendliness whereas the 1 3/8" float tubes from Northern

Competition and others requires machining out a "U" shape on the front of the sling swivel stud.

Purchase float tubes accordingly. Fourth is using set screws from the sides. This is the current flavor of the week in building National Match rifles. If you are working with a sight housing that was previously held on with pins, tap the holes to 8-32 and use four Allen screws (3/16" length will fit flush when screwed in, longer 1/4" screws protrude a bit. I prefer the latter.) You'll eventually find a customer who has boogered the hole for the Allen wrench and used Red Loctite to further make your life miserable.

Some of these will require being drilled out. Using longer Allen screws from the start may protrude enough to allow getting a pointed vice grip on it for removal if stubborn. It doesn't work all the time but works often enough to make it worth considering. When using the four set screw approach, modify the barrel by machining flats for the set screws to bottom out against. CLE (Compass Lake

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Far Center One for mounted sights using the caliper extension tail and two examples for loose housings employing caliper jaws. In case the caliper readings don't print clearly, the short one at the top will normally be close to 1.910". The tall F-type in the center will come out in excess of 1.960" and the "tweener" at the bottom is usually 1.940-1.950".

Engineering, compasslake.com) normally has these four set screw units in stock in both pre and post ban and various heights that will be described further along in the article. They can also machine the mounting flats in your barrel if you are not comfortable doing the work yourself.

Finally, there is the hybrid approach involving tapping two set screws in the forward barrel band from the sides (still requiring modification of the barrel to cut the flats) and then one set screw up through the existing hole in the bottom of the rear band. As previously men- Sight options will need

to be matched accordingly. Below center: Raising the front sight post up this high indicates some corrective action is needed.

Set the substitute post to the same level and the customer should not lose his zero. tioned, some float tubes will make this difficult and may require minor machining of the tube to accommodate access to the set screw. If you are going to do this I recommend using the same threads on all the Allen screws to make it a little more user friendly for the customer. White Oak Armament normally has three set screw hybrids in stock in both pre and post ban and in the different heights that will be described later.

Those who use the hybrid approach have their reasons. The first theory has to do with the tiny bit of gas that we see evidence of escaping around the top of the rear barrel band. They fear that losing this tiny amount of gas will either slow down bullet acceleration or result in malfunctions. The rear set screw tends to pull the top of the

rear barrel band down very tightly with the top of the barrel and will help seal off gas escape. While this may make a few people feel better it will do no good.

Both Derrick Martin of Accuracy Speaks and I have independently tested the complete shut off all gas at the port and not found a bit of velocity increase. Derrick reported his experiments in The Complete Guide to AR-15 Accuracy and I have reported my similar findings here previously. The other theory for the hybrid approach has to do with the pressures on the side mounted set screws applied to the barrel. Nobody I know of uses torque wrenches when tightening these four set screws from the sides.

It is not hard to imagine these unequal pressures may bend the barrel or influence harmonics. While evaluating some post ban barrels I tested this theory on the machine rest for grouping. I started with a barrel and a four-set sight on it and deliberately induced differences in Allen screw pressures. After

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050" on the left. Stock post center. On right is a CLE 0.060" post. Above center: Front sight adjustment tool with white paint mark helps keep track of bold elevation adjustments. Kroil and 0.1695" drill help clear rust from the plunger hole on neglected or abused housings.

You will usually have to shorten an Allen wrench to accommodate the cramped quarters. shooting groups with known lots of ammo I unscrewed the side set screws and replaced the sight housing with a hybrid unit with two side screws on the front barrel band and one through the bottom of the rear band. I deliberately tried to apply equal torque to each of the side set screws up front and refired the same ammunition.

All the guns were solid sub-minute four on either side as explained above plus one through the existing hole in the bottom of the rear barrel band. Once no-wind and mechanical zero are the same, the barrel bands and set screws need Loctite 290. Don't rely 100% on things holding and occasionally verify the set screws aren't backing out.

Having the five set screws just adds one more layer of insurance against the appearance of Murphy, so I am not opposed to

them. and I saw no difference between the four set screw or hybrid housings. Front Sight Windage Most windage adjustments are done on the rear sight and front sight elevation is adjusted only during initial zeroing.

Precision shooters prefer the I have seen gunsmiths using five set screws, mechanical and no wind zeroes to be the same and the methods Far If the customer requests the bottom set screw to lock his sight post the gunsmith will need to extend the threads downward using a 8-36 tap. described above (except for the old school approach) allow left to right movement after loosening the appropriate Allen screws. Start with the rear sight set to mechanical zero and fire a group.

Note the left to right distance and direction from target center and convert to minutes of angle. Clamp a sight gauge to the barrel with the stem of the dial indicator firmly pushing against the sight housing in line with the top of the sight post and set it to zero. Move the front sight housing in the same direction as the group from target center, the opposite direction you'd move a

rear sight. For example, moving the front sight to the right causes the bullet impact to track left. How far?

On a Service Rifle (standard AR-15 sight radius) one minute of angle is 0.006" of sight movement. Most of the gauges are calibrated in thousandths. Once you have applied the correction per the math above, clamp down the sight set screws, remove the gauge, and fire a second group. Clear the rifle and check if additional fine tuning is needed. You shouldn't need to fire more than a few groups to get it right. Set it in place with Loctite on the barrel bands and set screws when done.

If your sight housing has set screws on the sides, loosen the set screws on the rifle's bolt catch side to move the sight left and tighten the set screws on the ejection port side. A tiny little movement in the set screws will move the sight (per the gauge) along way so use restraint until you get the feel of things. On the hybrid sights that have bottom set screws, loosen them before attempting to make adjustments to the side mounted screws or you will be applying pressure but the sight won't be moving.

AFTER MAKING THE APPRO-

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priate adjustment to the left or right with the front set screws, retighten the bottom set screw. Pinned Sight Windage. Fortunately, most pinned sights come fairly well centered. These are not normally match quality rifles anyway but you may encounter one that needs corrective action. Determine how far off and the direction of the error. Derrick Martin suggests removing the front sight housing and sling swivel, then locating the gas port hole on the bottom of the rear barrel band.

Drill it out, tap it to 10-32, and install an Allen screw short enough that it will clear the new sling swivel rivet when screwed all the way in. Or save the drilling step and just tap it to 8-32, but the fatter 10-32 set screw gives more screw-to-barrel contact surface to help hold things as we proceed. Put everything back together including driving the pins back in their original position. Screw the 10-32 set screw down tight. Carefully drift the pins back out and install the gauge.

Loosen the set screw just enough to allow moving the sight base in the correct direction and called-for amount. Screw down the set screw tightly and secure with Loctite 290 on the barrel bands and set screw. After setting up overnight, dress the holes so the pins can be put back in place. Use either a drill or reamer of the correct size to match straight pins or a Number "0" taper pin reamer if using tapered pins. Once you establish a good fit, Loctite the pins as well.

Put the sling swivel back on using anew rivet and you should be in business. Hopefully, everything so far has been fairly straight for-

ward. Unfortunately the waters will muddy somewhat with the next sections due to lack of uniformity by some manufacturers of certain parts. While I apologize in advance, please remember I am just the messenger and I am trying to make some complex topics as understandable as possible. Afraid Of Heights?

You may not think you have acrophobia now but after reading this section you may be forced to reconsider. As near as I have been able to piece back together, life was good when all we had was the M16A2 with the standard front sight housing being 1.910". When Colt introduced the flat top and detachable carry handle things started to get mucked up a bit.

It seems the rear sight aperture on the Colt carry handle sight ended up being a little above that of a standard A2 rear sight aperture when both were completely down. Raising the rear sight of any AR by clicking clockwise moves the point of impact up. A taller rear sight does likewise and front sight changes move POIs opposite, so Colt released a taller front sight housing to "level out" the problem with the taller rear sight and get the zero issue back under control.

These taller sight bases sometimes have a raised "F" on them (for "flat top") but I have seen plenty that weren't marked. These sights run around 1.960" to 1.970". Bravo Com- Far Above, a taller A2 rear sight base is shown dropped into a carry handle. Doing so will cause a section of the stem to protrude out the bottom. Many USA (bravocompanyusa.com) offers "F" sight bases with no holes drilled for pins or set screws.

This deviation from standard is a wild card and was somewhat inconvenient but still manageable if gunsmiths paid attention. Other manufacturers of flat tops are not required to follow Colt's example or dimensions. Some didn't and receiver profile heights vary between manufacturers. Detachable carry handle dimensions also varied and some don't match Colt units.

I suppose it was preordained with all these changes and mismatches someone would come out with a sight tower mid way between the tall F-type and the original A2. I call it a "tweener" measuring 1.940-1.950". To further complicate matters, shooters look at and line up sights differently and stabilize the gun in various ways. Ammunition loads are also different.

To top it off, barrels also mount in their receivers differently resulting in gun-to-gun impact variations even with the same sights and fired by the same shooter. What's a poor gunsmith to do? First, it may not be quite as bleak as I have painted things. The front and rear sights both adjust for elevation so some mismatch can occur and often not even be noticed. I normally use the tall F-type housing on all flat tops unless I have a reason not to.

I would also use a lower sight base on a flat top if I know the owner was ever planning to shoot long range 1000 yard events because lowering the front sight raises the point of bullet impact and a bullet drops a

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lot at 1,000 yards. Shorter distance A2s get low or middle heights. Sometimes an A2 and a customer will just mismatch and can end up with a shooter having to raise his front sight post way up out of the well. There are two potential cures. The most obvious is replacing the existing housing with a taller unit. This causes the customer to lose his zero and the firearm normally needs to come back to the gunsmith's shop to do the swap. A faster and easier way is to substitute a taller front sight post.

There are three sources of these for 0.072" wide battle sights. DPMS makes a 0.030" taller post (Brownells 231-000-128), Bushmaster makes a 0.040" taller post (DPMS #F1003228) and Compass Lake Engineering makes one 0.060" taller. For more narrow 0.062" or 0.052" posts the only source I know of is Compass Lake. Tall posts let most customers swap them without returning the firearm to the gunsmith.

With a caliper, determine the height of his existing sight post and duplicate that with the replacement to keep the same zero. The raised flange of the sight post will be down below the flat shelf and proper support will be given to the post so it doesn't move around. You will also run into situations calling for shorter sight posts and I make it a habit to carry a modest stock of both tall and short posts in all three sight widths. My short posts are from Northern Competition and they are 0.050" shorter.

Other Considerations Most of the fat 0.072" battle sight posts are the same on all four surfaces, allowing one click increments of 1 1/4, just as Mother Nature intended. The narrower 0.062" and 0.052" versions are cut differently. They will be the stated width on the surface facing the shooter and taper down on the side opposite the shooter's eye. Likewise, they will often be taller on the surface facing the shooter and taper down toward the muzzle from the top.

This combination is supposed to offer a sharper sight picture and allow one to better focus on the front sight. Adjustment

wise, unfortunately, it complicates matters a bit. Instead of using every one of the four click notches, adjustments have to be in full five MOA revolutions. It helps me to scribe a white line on my sight adjustment tool to aid in insuring I've gone a full 360 degree turn when adjusting these sights. Also handy here is a penetrating oil like Kroil.

You'll likely get a customer that neglected his firearm. Perhaps he got caught in the rain and didn't dry the gun before storing it in a safe. The front sight plunger can end up rusting to the housing, making sight adjustments impossible. Sometimes these will be so bad that they will have to be drilled out. Prior to resorting to such drastic measures try soaking with Kroil overnight. If you are able to remove the plunger you may need to dress the hole in the sight housing if there is a lot of rust.

The plunger measures about 0.167" and a drill about 0.1695" should do the trick. Some brand new housings will come from the factory with burrs and will need dressing before they will accept the plunger as well. A decade ago it was popular to eliminate movement of the front sight post with a little set screw protruding down out of the female threaded hole for the male adjustment threads of the sight stem. That female thread doesn't necessarily go all the way down from the top.

The male threads on the bottom stem of the post aren't that long so there was no reason to tap the entire length of the hole with female threads. Gunsmiths would start a tap (8-36) at the top of the threads, follow them down, and continue to cut new threads clear to the bottom. Then, with a very short set screw of the appropriate thread, run it up from the bottom with a cut off Allen wrench until it hit the bottom of the sight post stem.

That would create a jamming effect and remove any possible movement in the sight post from vibration, recoil, and mishap. Some even got carried away and applied Loctite, thus insuring that if the sight had to be moved the process would be as difficult as humanly possible! Guess what?

When you shoot 1,000 yards away you must adjust the front post and quite smartly at that!

Just discovering that your well meaning gunsmith has a small set screw Loctited in place preventing your post from being screwed down it is guaranteed to send a shot of adrenaline through you that won't wear off before being called upon to fire 1000-yard match. Our team of Army Reserve Service Rifle shooters only had one or two using set screws. The rest wisely backed theirs out. I finally quit proactively even putting the set screws in there and only put them upon request and I had very few requests.

Try wiggling a sight post on an AR-15 and it will likely have no front post movement. Gunsmiths going to all that needless work a decade ago was an example of what my friend, the late Jeff Cooper, would have called "The ideal solution to a nonexistent problem." Be sure to protect your sights. Sight protectors made of hard plastic in clamshell shapes for both the front and back are worth their weight in gold! They keep the dirt out and protect against all but the most grievous damage.

Any time you aren't shooting you should have these in place. Zeroes And The "Dead Zone" In most applications of the black rifle we set the height of the front post once during the initial zero phase and never touch it again. All adjustments for distance are accomplished on the rear sight. Thousand yard shooting is different, however.

You simply can't get enough elevation adjustment out of a regular A2 rear sight and need to use the front sight and to reach out about 6/10 of a mile we have to lower the front post significantly. The majority of National Match shooters base their 1,000 yard zero off of a known 600 yard zero. Most shooters fall into two camps. The first screws the front post down three complete revolutions for a total of 15 min-

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utes, then comes up approximately 40 clicks on the rear sight (10 minutes for 1/4 minute match sights.) The exact number of clicks on the rear sight is extremely variable depending on the shooter's ammo, his sight picture, what hold he uses (6 o'clock, flat tire, center mass, etc.) You can give or take at least a couple of minutes from what I quoted. The 40 clicks on the rear sight will get the shooter's head up pretty high on the stock and may compromise cheek weld some.

It will allow plenty of post to stick up above the shelf of the front sight, however, which some shooters like. The second camp goes down another full revolution (four total) on the front sight (20 minutes) and comes up about 20 clicks on the rear sight. There will obviously be less of the front sight post showing above the housing but the cheek to stock weld should be better because the rear sight isn't jacked up so high.

It is because of the second camp that I choose to outfit my 1000-yard rifles with the lowest front sight housings, allowing more of the post to show above the housing. In order to keep track of these downward front sight revolutions I like a white vertical paint mark on the front sight adjustment tool. Also remember to run the front sight post back up to its normal position. Both of the sight adjustments will arrive at the same 1,000 yd. Point Of Impact (POI), just in two different ways. Which is better?

It depends on the dead zone. Many common and popular rear sights on the market have a dead zone at the top of their range, about 12 clicks clear at the top. The number of clicks is quite variable. When you jack that rear sight up so high into that dead zone nothing happens. Continued clicking feels normal but the sight doesn't move! Test for this by attaching a sight gauge set for elevation tracking. Run the rear sight up to the top and click back and forth and see if it is responsive.

If not, work up and down until you find where the clicks actually start to register. I used to go down one or two additional clicks from that point and paint a red vertical line on the elevation wheel as a reminder to the shooter. It is common for Compass Lake Engineering, White Oak, and Rock River rear sights to have dead zones at the top. I don't know how many other brands have this because I only use the three mentioned companies due to their normal superior quality otherwise.

Northern Competition markets a 1/4x1/4 MOA rear sight claiming it's designed to avoid a dead zone but admit that it also has just a few less usable clicks than the others so I don't see that as a solution either. Since so many sights out there have dead zones the right way to deal with it is shooter management. Begin with getting the right base zero established at the closest distance the shooter will ever fire.

All NMC shooters fire Standing and Sitting Rapid strings at 200 yards, however, many of them practice at 100 yards on reduced targets. Those folks need to establish their base zero at 100 yards to accommodate this. To establish the base zero the shooter begins with the rear sight down as far as it will go, then come up about three clicks to allow lighting variances and other factors that influence elevation. Some shooters will need more than this.

Then use the front sight post to finish elevation zeroing at the shortest distance. Elevation is then adjusted from here up to 600 yards with the rear sight and recorded. The proper base zero coupled with going down four complete revolutions on the front post and up about 20 clicks on the rear sight from the 600 yard setting should keep shooters safely away from the dead zone. As long as the shooter establishes a base zero using the instructions above, worries about the dead zone only apply to 1,000 yards.

At 600 yards the sight should never be up high enough to encounter this. The use of 20" barreled flat tops with carry handles in NMC shooting is becoming more popular

but is it possible to use them out to 1,000 yards? Depends! It is common to use the tall "F" front sight housing with flat tops and that's not good for 1,000 yards. Also, carry handle rear sights don't have as much upward adjustment as regular A2 housings.

I measured the lengths of the elevation thread stems on both and found a difference of 0.068" which is the same as 45 quarter minute elevation clicks. Northern Competition has worked out a solution for the rear elevation problem on carry handles by substituting the longer sight base of the normal A2. When screwed clear down this will result in the thread stem protruding out the bottom of the carry handle which would prevent it being mounted on a flat top.

They simply locate and drill a hole in the top of the flat top receiver to allow the excess sight stem to go down into it. If that somehow cosmetically offends your sensibilities (it shouldn't because the hole is covered by the carry handle and is not visible) you could always have two carry handles, one set up with the standard rear sight base and a second with the tall base. The second carry handle would be reserved strictly for 1,000 yards where the rear sight is going to be up anyway.

In that option the bore hole in the top of the flat top receiver isn't needed. The trade off is saving machining time to bore the hole versus the added cost of a second carry handle. The 1000yard carry handle could stay zeroed for that distance all the time requiring only the appropriate front sight adjustment on days when the shooter desires to shoot the longer distance. "Where there is a will there is away" is a good note to close this article.

You now know the sight tower and post height options, and how and when to apply them either in helping customers get zeroes or when building uppers from scratch. Keep a modest stock of the sight housing options and different height posts and you should be able to cope with the challenges using the tips in this article. AG

MAINTENANCE & REPAIR

Repair And Restoration Of Broken Stocks

A customer's broken stock had all the looks of a throwaway until a closer look revealed otherwise.

BY NORMAN E. JOHNSON AUGUST 2015

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It began with a phone call from a hunter whose son had dropped his M77 Ruger .270 WCF from a tree stand and broke the stock. Both were saddened by the incident and they came to me questioning the cost of a new stock. They hadn't brought the gun with them, having no thought that the stock could be repaired.

Luckily, they lived only four miles away, so the father had his son pick the gun up to have me inspect it. The break completely through the right side of the small of the stock from the tang mortise above, including the checkering. The fracture extended—On close examination of the stock, I found a jagged, trans-

verse. Below left, clockwise: These pictures clearly show why the rifle owner thought the stock was damaged beyond repair.

The break extends completely through the stock from the top of the pistol grip, through the checkering, diagonally through the underside of the stock, through the trigger guard recess, and up to the magazine cut out.

REPAIR AND RESTORATION OF BROKEN STOCKS CONTINUED

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All excess material is removed before the clamps are used to hold and close the crack. ed inward through the web forward of the trigger mortise extending into the magazine opening. Orthopedic surgeons would term this a comminuted fracture requiring hours of meticulous repair. With the action still in the stock I could apply gentle pressure and readily open the cracks. All pieces of wood appeared intact and the cracks seemed to close quite well as I applied linear pressure to the stock.

Because of that I felt I could quite successfully repair the stock and was given the go-ahead to do so. It wouldn't be my first one while using the gentle touch of a surgeon. American Gunsmith readers may recall my October 2011 article ("Breathing New Life Into A Shattered Old Gunstock") where I had restored a 130-year-old Wm. R. Burkhard shotgun which was a total mess put together with metal bands and screws.

Repairing And Refinishing Selection of the required tools and materials was pretty straight forward: Epoxy, sandpaper, special epoxy applicator, clamps, wood stain, and

stock finish. The stock was Clamps remain in place until the bonding material is fully set. The J-B Weld was mixed in the bottom of a soda can and carefully forced into the cracks with a cut-down feeler-gauge. held horizontally in a padded vise so I could carefully open the crack by applying lateral pressure.

This maneuver was required in order to work epoxy fully into each of the cracks, however, too much pressure could result in a fully broken stock. I used 80 pounds of compressed air to force out any dirt or chips that would interfere with complete clo-

REPAIR AND RESTORATION OF BROKEN STOCKS CONTINUED

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The cracks in the stock are totally sealed with no evidence the stock was badly broken. sure of the crack during the bonding process. There are several suitable epoxies that can be used to securely bond materials together, including wood. There must be sufficient working time with a reasonably thin viscosity while the work is being done. The cracks in the wood stock must fit closely together for good dimensional stability and action-to-stock fit.

In this case I used J-B Weld which has excellent bonding qualities and a working time of around twenty minutes at room temperature. I mixed about a level tablespoon full of material which was applied with a cut down

length of 0.020-inch thick flexible feeler gauge stock. Each crack and opening was carefully filled and the cracks in the broken stock were pulled together by straightening the stock. Each crack oozed of bonding material, then wiped clean as the stock was further straightened.

Two padded C-clamps were immediately applied, further forcing bonding material out, and all excess bonding material was wiped off, particularly on the checkering surface. The clamps remained in place until the epoxy was totally set. Examination Of The New Work This type of stock repair and renovation is analogous to a patient undergoing orthopedic and plastic surgery together and the

outcome won't be known until the bandages are removed. Beneath the padded clamps appeared to be a pleasing result.

The cracks had totally sealed and were quite unrecognizable as a broken gunstock—a minor miracle. For adding finishing touches and before the bonding material set to a glass-hard state, all particles were removed from the checkering. I didn't want to recheck any of the stock and didn't have to. A trick in avoiding bonding material sticking to the checkering is to apply a very light coat of release agent, such as used in action bedding. On a repair such as this involving the cut-checkering,

REPAIR AND RESTORATION OF BROKEN STOCKS CONTINUED

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it is important that the checkering align well or the mismatched lines will detract from its appearance. I then lightly sanded the virtually invisible cracks in the wood and refinished the entire stock with Birchwood Casey Tru-Oil. When the owner called to pick up the gun, he asked how it turned out. "You'll have to see," I told him. Perhaps this left him with a bit of trepidation, which was erased with The work was done at a fraction of the cost of purchasing anew stock. a smile as the stock was examined.

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As gunsmiths, we will inevitably encounter some questionable repair jobs. Sometimes anew part or even anew gun would be the easiest solution but I strongly believe we owe it to the customer and ourselves to consider the alternate approach and repair or make apart. There will always remain a place for the innovative and resourceful gunsmith who can visualize.

MAINTENANCE & REPAIR

Recoil Pads For Synthetic Stocks

Installing recoil pads on synthetic stocks instead of wood.

BY ROBERT K. CAMPBELL AUGUST 2015

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A common job around the shop is to replace an aging recoil pad or to fit anew pad to an existing firearm. Recoil pads may increase the length of pull and modify fit. Sometimes they just perform their intended function of decreasing the rap received on the shoulder when firing a hard kicking firearm. Fitting the butt pad is a steady job for gunsmiths that is accomplished mostly with hand tools and time proven techniques. Measuring tape, duct tape, and ascribe are just a few of the tools needed.

About half of the recoil pads I install are because of problems with length of pull rather than any problem with severe recoil. There is a distinction between the butt plate and a recoil pad. The butt plate may be thin and it may be steel and it doesn't do anything but cap off the stock. The recoil pad is also a butt pad in a manner of speaking but serves an While it works OK a superior fastening can be done with both screws and epoxy. additional purpose.

It's fine if the customer is concerned with recoil but you still need to be certain that you do not affect the length of pull in an undesirable manner. The length of pull is the distance from the trigger to the end of the stock and the area where the butt pad snugs into the shoulder. Most individuals will be best served with 13-14 inches of pull. Be certain to check and see if the individual will be firing the gun with a heavy hunting coat. Clothing and seasonal choices may affect the desirable length of pull.

While recoil is always a consideration, be certain that the length of pull isn't compromised. I often select a thicker butt pad for hard kicking shotguns and the heavier rifles. I have used KICK-EEZ products with excellent results (kickeezezproducts.com). A lightweight .30-06 or a pump action 12 gauge may batter the user. There is a lot you can do when you change the recoil pad to give the user more comfort and a better fit. You might even change the angle or the pitch of the stock if desired.

The care in fitting a pad to a rifle that has only worn a metal butt pad is important. Without the initial pilot hole we may crack the stock. Be certain to run the pilot hole first. Some thickness of recoil pads are more difficult to find. A composite material stock requires a different set of rules and procedure than a wooden stock. Some of the procedure is challenging as there are certain procedures directly linked to the synthetic stock.

A common complaint isn't always related to the recoil of a lightweight rifle with no recoil pad. A hollow synthetic stock often gives the impression it will startle game. A small bump leads to a reverberation that may sound like a drum. Filling the stock with some type of sound deadening material (about 75% full) is good. There are several means of filling the stock. I have used filling covered by fiberglass resin. A quick fix that doesn't necessarily work out is to use foam-type insulation. One

RECOIL PADS FOR SYNTHETIC STOCKS CONTINUED

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85 inch long by 1.5 inch wide unit rather than a Remington 700 pad. This makes a great deal of sense and ensures a good fit. squirt and the stock is filled and sounds good at first, however, the chemicals in the foam and carrying agent are corrosive. Even stainless steel may be affected. Once the foam dries the problem seems to abate but during the drying process corrosion is a real danger. In pursuing the correct part for every rifle at times we simply come close.

By that I mean we order the part with the closest dimensions possible and hand fit it to the rifle. Some recoil pads fit properly but often enough the pad will allow only one screw to be tightened, requiring the pad to be glued

on. This is common with the best made pads and stock. In order to properly glue the pad to the stock I mark the outline of the butt-stock on the pad, not the other way around. The stock's butt should be scribed on the pad to be installed, then use the bead to seal the recoil pad to the stock.

If the recoil pad has to be modified or sanded, do this before the final gluing. There is a neat trick to this assembly that involves extra time and care but results in superior chemical bonding. Carefully drill around both the edges of the stock and the edges of the butt pad with 1/16" holes (I have also used 5/32 drill bits with good results.) These holes will fill with epoxy and keep the butt pad and the

stock bonded. Be careful as some stocks are terribly thin, but this is necessary for a good bond.

Take your time and drill a slight indentation with the stock stabilized to insure no slip ups. Use a weight to keep the butt pad and the stock together after the epoxy is run along the stock. No matter how careful you are during the process there will be an over run of epoxy. Let the stock and the butt pad set to dry for at least an hour. The bond will still be soft at this point but will be solid enough to allow handling.

Trim the excess epoxy that has inevitably leaked from the stock and recoil pad joint for a clean, professional look.

RECOIL PADS FOR SYNTHETIC STOCKS CONTINUED

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The location depends upon the dimensions and construction of the stock. Applying A Curve Sometimes custom work is needed when fitting a pad, such as applying a curve to properly modify the recoil pad. Hold the recoil pad to the bare end of the stock. Trace the desired dimensions of the recoil pad on the pad surface, never neglecting to scribe each side in turn. Next, slowly grind the interior portion of the recoil pad until you are very close to the needed measurement.

I do not rush but grind pretty close and then slow down as I grind out the final dimensions. After It is easily trimmed after letting the stock set about an hour first. you have accomplished the proper curve, there will probably also be an overlap of the recoil pad in the width dimension. With this dimension carefully marked off, sandpaper is usually all that is needed to finish out the recoil pad. I use coarse paper at first. If this doesn't finish up clean I'll use a lighter grade as the finisher.

I mentioned pilot holes earlier. You cannot usually do this with a synthetic stock, which is why I stressed the previous method. If possible, a pilot hole is begun with a slightly smaller bit than the recoil pad screws you intend to use. After the pilot hole is established, confirm the screws will be properly lined up. Drive the screws into place with a power drill. All in all, recoil pads area simple drop that requires a little attention to detail for the best outcome. AG

TOOLS & FIXTURES

A Charter/High Standard Cylinder Jig Made Easy

This shop-made jig turns a three-handed job into a 30 second snap.

BY DICK MAHEU AUGUST 2015

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For some time, I had contemplated writing an article on a useful jig I made in my shop. A comment posted in the American Gunsmith Reader Forum told me it was the right time for it. I'm not sure exactly when I made this jig but remember the gun I was working on at the time that prompted me to search for a better way to disassemble High Standard Double Nine revolver cylinders. This jig is adaptable for all Charter Arms revolvers as well as the High Standard Rand W-series revolvers.

This jig and its accessories were made with pieces of scrap metal I had on hand so no extra cost was involved. I keep on hand plenty of pieces of steel, brass, and aluminum I scrounge in various places just for projects like this and have done so for many years as a gunsmith. The pieces were as-is and all I did was drill and tap them in the manner I'll detail below. The purpose of this jig is to make simple the complete disassembly of Charter Arms and High Standard cylinder assemblies.

Some of the parts will differ in name between the two makes of revolvers but their function will be basically the same. For those of you who have undertaken the job of completely disassembling these revolver cylinders, you will understand the frustration I speak of here. It is literally a three-handed job. This jig makes it easily a manageable twohanded job. Why take the cylinder completely down at all?

On the Charter guns, which you will find mostly in .38 Special, .357 Magnum, and .44 Special, it's usually not necessary as routine cleaning can be done with the parts intact. On the .22 caliber Charter Arms and High Standard revolvers a lot of dirt and debris accumulate within the cylinder parts and make it necessary to completely disassemble the cylinders for proper cleaning. If built up enough, dirt and debris will cause function and timing issues in these revolvers.

The jig's function and use is pretty straight forward. After removal of the cylinder assemblies from the Charter revolvers, the cylinder pivot is a screw. On the High Standard revolvers, the crane pivot is a

spring loaded plunger. The complete cylinder assembly is mounted in the jig as removed from the frames. Jig Make Up Parts of the jig can vary in size with some limitation depending on what you might have available. The base of my jig is a piece of tool steel 4 3/4" x 2" x 3/4".

The 90 degree angle piece is 2 3/8" high with a 1 1/4" base and 7/8" width. The angled piece is the rear of the jig. This piece is also tapered in thickness at the angle because this is what I had available. The straight piece is the front of the jig and is 2" high, 1" wide, and 9/32" deep. It also is a piece of tool steel. Holding these two pieces of tool steel together are 12 x 24 Allen head screws. The two holding the angled piece are 15/16" in length and the two holding the straight piece are 13/16".

Again, these are what I had on hand. The two brass screws are used in the utilization of the jig and are 10 x 32 with lengths of 7/8" and 2". Of the three aluminum pieces shown in the jig breakdown, one is 1/16" thick, the second is 1/8", and the third is 1 3/8" x 1/2" x 1/4". The two holes at the top

A CHARTER/HIGH STANDARD CYLINDER JIG MADE EASY CONTINUED

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of the front straight piece are drilled and tapped with 10 x 32 threads for the two brass screws. A 5/16" hole is drilled at the bottom face of the angled piece. You will have to adjust the placement of this hole depending on the thickness of the base of the piece you use in your jig. Because my piece had a thick base, my 5/16" hole was 11/16" center to base. Using The Jig The cylinder assembly is mounted between the angled and straight pieces of steel with the ejector rod going through the rear 5/16" hole.

The cylinder lock plunger at the front of the ejector/ratchet is against the brass screw mounted through one of the two tapped holes in the straight piece. This is similar to mounting up a barrel in a lathe between two centers. The ejector/ratchet must be extended forward before mounting the cylinder assembly. On the High Standard cylinders there is a lug on the shaft of the ejector/ratchet slightly ahead of the access hole in the shaft. Push the ejector rod in to push the ratchet forward.

When you are just past this lug, turn the ratchet shaft about 1/4" to the left and it will lock the ejector/ratchet in place. On the Charter revolvers there is no lug on the shaft. This is where the 1 3/8" x 1/2" x 1/4" aluminum block comes into play on the jig. It is used to lock back the ejector/ratchet in the extended position just as the lug does on the High Standard shaft. Place this block widthwise between the cylinder face and the back of the ratchet. The jig is now ready for use.

The reason for the two tapped holes for the brass screws is because of the size differences between .38/.44 cylinders and .22 rimfire cylinders. On my jig I use the lower tapped hole for .22 rimfire cylinders. I use two different length brass screws because of the different lengths of cylinder/yokes you will encounter. The ejector rod is pinned to the ejector rod bushing in the Charter revolvers and the cylinder lock plunger in the High Standard revolver.

These two parts, though of different names, share the same function. These are very small pins and need to be drifted out through the access hole in the

ejector/ratchet shaft. The idea of the jig isto screw in the brass screw until the pin hole and access hole lines up so the pin can be driven out downward with a 1/16" or 1/32" pin punch, making it a simple twohanded job.

Leave the pin punch in place until you have restrained the bushing/plunger with a finger and slowly release the pin punch as this assembly is spring loaded and powerful enough to launch the bushing/ plunger into orbit! These pins are of precise length and need to be reinstalled precisely through the two parts without overhang on either end, so as not to interfere with the ratchet shaft operation. On reassembly, I simply line up the three holes with a short slave pin.

Holding the pin with small sharpnose pliers, tap it in and replace the slave pin. The 1/16" and 1/8" aluminum pieces serve as shims under the angled piece for larger circumference cylinders as is the higher tapped hole in the straight (front) piece. Your methods and jig may look a little different than mine, however, I'm sure they will serve you just as well as mine has over the years I've utilized them. AG

FROM THE ARCHIVE

Choosing Suitable Gunsmithing Schools

Solid education is critical in any field, gunsmithing included.

BY KATHY MANNEY AUGUST 2015

ORIGINAL PP. 19-20

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To become knowledgeable in choosing a trade school means finding out beforehand if the school is going to provide their students the education and experience to actually practice the trade that they are considering. To do this requires perspective students to look beyond the nicely illustrated school brochure. Dave, a graduate of the Colorado School of Trades is a case in point. While serving in the Navy, Dave enrolled in a correspondence gunsmithing course.

A focused and knowledgeable young man, Dave sailed through the long-distance learning course, receiving high marks throughout. Upon completion, he was awarded a certificate to hang on the wall. That is about all Dave feels he accomplished for his efforts; a worthless, decorative certificate. Dave is married and father of two. He and his family live in the mid-west where seasonal outdoor hunting is popular.

Wanting to start his own business, Dave began to consider the feasibility of operating a gunsmithing business in their rural town. To earn the background required to be considered a professional gunsmith Dave needed more than a passable correspondence schooled gunsmith course. Dave knew he would have to return to school, a

real hands-on gunsmithing school that offered in-depth lab work, not a less intense long-distance school as he had chosen before.

There are fewer than ten in-residence gunsmithing schools in the United States and after much consideration Dave chose the Colorado School of Trades in Denver's Lakewood community. Dave's decision was not an easy one to make. It required him to leave his family for more than a year. Dave's choice of school was based in part on the Colorado School of Trades curriculum of four major sections in the study of gunsmithing. These are gun basics, machine shop, stocks and in the final phase design and function of guns.

The school's 1800 hours course of studies is mostly self-pacing and the class size is small. Classroom instruction covers the use of measuring tools, welding and heat treating, wood selection and stock finishing, ballistics, reloading, triggers, sights, gun design, theory, business and various gun manufacturer's armorer courses. The armorer portion is non-compulsory to getting your degree but highly recommended.

The basic course of gunsmith study is where students become familiar with hand tools, polishing and bluing of guns. During

basics students make several useful gunsmithing tools and polish and blue two customer guns. This is where students are taught to hand checker a stock and write "Cycle of Operations" papers. Machine shop covers lathe usage. While taking this course, students thread their barrel and put on the action and test fire it. Here too, students learn the basic machine skills necessary to work on guns.

Oxy-acetylene welding, high and low temperature soldering, silver solder and brazing are taught at this time. The stocks curriculum is where students take their barrel action and inlet it into a wood stock and fiberglass stock. This is when creativity comes into play and the fine art of stock making is taught. Students are required to put on a check piece, fore end tip and grip cap on one or both stocks. Using their creativity, students decide how they want their stocks to look.

Lastly, they blue their barrel and action and present both stocks and action for their final grade. Design and function is the final section and will take the longest to complete. This is where students apply the knowledge they have thus far gained and put it into use. By "luck of the draw" each student is required to clean and repair 25 cus-

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tomers guns. These are guns brought into the school to be worked on by students at a discount rate. Once the student has completed this phase, he must work on 10 elective guns, either his own or guns brought to them by family, friends or customers of the school. Upon completion of repairing and/or cleaning these 35 guns the student moves into specialization. Specialization is a personal choice.

Students can choose how to work on triggers, specialize on a particular gun type, and make special tools or anything gun related. In-residence gunsmithing schools require intense hands-on lab work in basic and advanced gunsmithing in one of their gunsmith shops and most students are readily supportive of one another.

When a student graduates from an in-residence school like the Colorado School of Trades they will have obtained not just a diploma, but associate occupational studies (AOS) in gunsmithing, a degree earned by actual doing and setting up for success in a gunsmithing career. Most of the students attending the Colorado School of Trades come from outside the state of Colorado. Many have come from as far away as Japan, Norway and the Virgin Islands.

There is a six month waiting list to get in and students need to arrive having already mastered good basic mechanical skills and possess a staunch desire to learn. Though few women apply to gunsmithing schools, they are welcomed and encouraged to apply.

The Colorado School of Trades school's machine shop is equipped with more than twenty lathes, five milling machines, six universal grinders (students learn tool bit grinding and make their own basic gun-

smithing tools used in the course and in business), bluing stations, drill presses, oxy-acetylene welding and live fire range.

Each student must provide an equipped toolbox and is assigned one of the school's workbenches where he will construct two rifles, barreling the actions, and making and finishing the stocks to learn all machine shop operations necessary in the gunsmithing trade. If your goal is to learn to become a custom gun builder, a good gunsmithing school is the place to get started. In-residence schools are focused on students completing over 1500 hours of shop and lab time with 295 classroom hours.

In addition, The Colorado School of Trades has an extra study reference library available to its enrollees. Prospective students applying to an accredited gunsmithing school must be at least 18 years of age, have a high school diploma or GED and be physically and mentally capable of carrying out the class work for graduation. In addition, an individual must be able to meet requirements of the Bureau of Alcohol, Tobacco and Firearms to successfully apply for a Federal Firearms License.

Anyone with a dishonorable discharge from the military or has a felony conviction need not apply. The catalog addendum states the requirement of accident insurance, "All students attending the Colorado School of Trades are required to have some type of health or accident insurance coverage. All students who have coverage will be required to provide documentation.

Those who do not have such coverage will be required to purchase an 'accident insurance policy.'" The Colorado School of Trades offers a simple policy for a nominal cost that

covers the student during their time of enrollment. The objective of most gunsmithing students is to go into business for themselves or to work as a gunsmith for a custom gun shop or gun store, so in-residence schools train their students to learn general gunsmithing so that most students can start their own business directly upon graduation.

Nearly all gunsmithing schools cover business basics that go over owning and operating a business. The school's dropout rate is a low average of 5%. In addition, while in attendance at the Colorado School of Trades, the school sponsors a number of social activities that include a monthly cook-out, monthly range day and for a small fee, membership in their gun club. The cost of a good gunsmithing school, including tuition, tools and miscellaneous will cost more than \$20,000.

Most gunsmithing schools offer some type of financial aid or financial options such as PELL grants and many students use government assistance such as GI bill or VA (Veteran's Vocational Rehab) programs. The majority of applicants qualify for some financial assistance.

Armed with the knowledge of what it takes to become a skilled gunsmith and what trade schools offer, especially correspondence courses versus in-residence schools, allows perspective gunsmith students to make a more informed choice for the right match. As with most occupations today, a diploma from a good school can be an entry to a rewarding career. AG

PEOPLE & COMPANIES

Servicing The Timney M510 Trigger

Service and adjustment of aftermarket triggers requires careful attention to detail.

BY NORMAN E. JOHNSON AUGUST 2015

ORIGINAL PP. 21-22

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Here I will discuss the Model 510 Timney trigger as installed on a short action Model 700 Remington rifle chambered in .22-250 Remington. The rifle was equipped with a 1:10 twist Douglas premium barrel and used for both targets and varmints where accuracy is essential. As received, the Timney M510 trigger was set at 1.6 pounds. The trigger was very dirty and the firing pin would sometimes fall on bolt closure, particularly if a slam-fire maneuver was used.

I began by thoroughly cleaning the trigger using lacquer thinner, a brush, and 80 pounds of compressed air. I then gave the trigger a

thorough inspection. I couldn't recreate the slam fire or failure to cock on bolt lift. Sometimes cocking a rifle and pulling the trigger with the safety on, followed by releasing the safety, will cause a lightly set trigger to fire the rifle, but this rifle passed that test.

In any case, I felt this trigger should be adjusted to just over two pounds which was accomplished by both increasing trigger spring pressure and sear/trigger engagement. At top center the sear/trigger inspection port is shown with rifle cocked. Adjustment of the M510 trigger requires use of all these tools. The Model 510 Timney trigger is equipped with socket head lock nut screws in 1/16"

and 1/8". The larger 1/8" is for overtravel and the smaller two control sear/trigger engagement and trigger spring pressure.

Turning the sear engagement screw inward will cause a cocked rifle to fire. Turning the trigger spring inward will increase spring pressure and trigger pull. Of course, before beginning any disassembly, maintenance, or adjustment unload and clear the firearm. To begin the adjustments, I back off the sear/trigger adjusting screw a full turn, cock the rifle, and then view the sear trigger engagement

SERVICING THE TIMNEY M510 TRIGGER CONTINUED

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Left, clockwise: These three sequential pictures show the position of the sear and trigger from pre-cocking through trigger/sear release. On left, as the rifle is cocked the sear moves forward over the top of the trigger. Center, the sear at this point overrides the trigger, then cocking the rifle. The degree of override has an effect on trigger pull force. Right, the rifle is fired here.

Note the released sear falls below the top plane of the trigger, enabling the firing pin to thrust forward, through the small hole located at the top of the trigger housing. At this stage you will note the upper rearward part (the sear) at the top of the trigger well engaged. Now turn the sear screw very slowly inward until the rifle fires. You can then attain the desired sear/trigger engagement you want by backing off this screw about a full turn and rechecking things through the viewing aperture.

At this stage, take a trigger pull force reading as sear/trigger engagement alone has a bearing on pull weight. If it is not quite where you want it, adjust the trigger spring by 2.2 oz. loosening or tightening it. Adjust this

spring accordingly to the desired pull weight you want. As the rifle fires, you will note the sear positioned downward and rearward of the trigger as you view through the aperture. Experimenting with the spring tension and sear/trigger engagement will give you the pull weight you want.

Just be sure you are working with a clean trigger. With most triggers you will not be able to visually observe the working of the sear and trigger but this is what takes place during adjustment. Trigger Lubrication There are a few special trigger lubricants on the market. Differing schools of thought surround the use of trigger lubricants. Some feel that any and all lubricants will eventually congeal and gum up.

Temperature changes will affect most forms of lubrication applied to the trigger as well, which must be considered as conditions change. Almost all forms of lubrication will change over time. Over more than 50 years of working with a variety of hunting and target triggers and shooting under temperature extremes, here is my thinking on trigger lubrication: A totally clean trigger with a thin syn-

thetic lubrication will function for at least a year with no problems. One caveat must be observed here.

Avoid all bore cleaning materials from entering the trigger. As a bore cleaning brush soaked with liquids is passed over the exposed trigger and sear, there will invariably be spillage into the working parts of a trigger. This attracts foreign materials and trouble is sure to follow. Always use a bore guide where you can as a preventative measure. Conclusion There are no real mysteries involved with proper care, cleaning, and adjustment of most triggers.

Triggers will vary widely and require a careful study of each their function. I have had good success cleaning triggers with lacquer thinner and compressed air, followed by a drop or two of lubricant forced into the trigger with compressed air. If you lack experience adjusting triggers, don't take chances as problems can arise. Talk things over with a qualified gunsmith if in doubt or have one do the job. AG

RIFLES

Reader Forum

BY AMERICAN GUNSMITH EDITORS AUGUST 2015

ORIGINAL PP. 23-24

As an extra safety check, I cock the empty rifle with the safety off and slap the side hard three times with the muzzle up, then drop the butt about a foot onto a padded surface three times to insure it is safe for hunting. The customer was instructed to fire the rifle before taking it afield and reported it was noticeably better. Author RK Campbell responds. Thanks for reading American Gunsmith. Your procedure seems good, and I am going to add the safety drill to my own work.

You are correct, often painstaking work with the existing parts produces good results. These days we are more likely to simply install aftermarket triggers. After reading RK Campbell's Remington 700 article I was left wondering if the author is unaware of the history of unintentional discharges occurring with the Remington/Walker trigger.

If so, I strongly urge him to read *Unsafe By Design: Forensic Gunsmithing and Firearms Accident Investigations* by Jack Belk (independent.academia.edu/JBelk) and also do an Internet search on the Remington/Walker trigger design. Jim Corolewski Ramsey Gunsmithing Author RK Campbell responds. I have used the Remington rifle for some forty years. The US military has used them for thousands of sniper rifles over many decades of service.

While any rifle may have the occasional problem, the Remington 700 is a good product. There have been improvements in the action just the same. Also, the safety test must never be neglected in any rifle. Gunsmith Lists I'm anew member from Carlsbad, California. I'm investigating a second career in gunsmithing when I'm done with my "day job" and am ready to pull up stakes and move.

I heard about your Association last March, immediately signed up and am glad I did, having received Learn Gunsmithing, The Troubleshooting Method as well as

the monthly publications. I'm already much better informed though not even close to staying caught up on my reading assignments. There is a huge learning curve but I'm motivated and trying to be methodical. "Thank You!" is what I think I'm trying to say. Daniel P.

Horn Huron, SD I am pricing out a few possible new purchases over the next couple months (two rifles and a revolver at least) and maybe two of which will no doubt need tuning plus a few upgrades. Thought I'd offer the business to a local, independent gunsmith instead of longhunt.com or similar outfit, especially if he just landed his Type 01 license as I'd be happy to help support his entry into the profession.

I know I'd love the opportunity when I'm breaking in someday, but it's really difficult to find gunsmiths out here who aren't tied in with an established business, especially if you're trying to stay away from the national chains. Does AGA publish lists of Type 01 license holders? If not, could you tell me how to find one?

If there is no such list available, maybe you could put me in touch with one of your members within 50 miles or so of my Carlsbad, California home or Orange County office who runs his own shop, even if it's just it is a by-appointment only operation. It would be great to meet someone who can make suggestions on my pending buys, help me with the purchases, handle FFL paperwork, tune the guns when they arrive, and hang out when they're ready to take for a spin.

Stephen Blaine Carlsbad, CA We're publishing your letter so interested gunsmiths can contact you. While we don't maintain a formal list, there are a few resources available on line. Visit usacarry.com/directory/category/gunsmiths, goal.org/gunsmiths.html, and gunsmiths.regionaldirectory.us.

READER FORUM CONTINUED

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Marlin and S&W I have two guns recently brought into my shop. The first is a Marlin 39A made in the mid 50s that the lever locks open when working the action, From what I can see the carrier rocker is hitting on the cartridge stop. It looks like the cartridge stop sticks out just far enough to let the carrier hit bottom edge of it. Should I stone the edge so it is a little more rounded and let it slide by or is there something else I'm not seeing causing the problem?

The second gun is a Smith & Wesson Model 10 that lost the hammer nose bushing out of the frame. I've tried replacing it, having purchased two different sizes. One is a little smaller than the other and falls right out. The other seems to fit a little tighter but after firing a out, causing the cylinder to jam. Should I use Loctite to put this back in or is there another size bushing available?

You can try smoothing up those contacting parts but the 39A is getting up there in years and likely to have seen considerable use. Add to that the possibility of a certain amount of abuse. The most common to come our way in lever action rimfires is a tendency by the operator to see how fast the lever can be cycled to set up the next shot. When the force exerted on the lever becomes serious enough, the lever will tend to loosen and behave in a somewhat sloppy manner in the receiver.

In fact, the lever may even become bent and the best cure for that is replacement. We know for a fact that many lever gun owners have the hankering to hang on to the lever and swivel the whole rifle on it to extract/eject the spent round, chamber anew one and cock the gun. They've seen it done on TV Westerns dozens of times. Unfortunately, all lever actions were never built to be recycled like a yo-yo.

Closely look over the interior of the receiver, paying special attention to the area in or near the firing mechanism and any signs of serious wear in the lever linkage.

Smear some Dykem or even magic marker on suspect areas. Polish up the cartridge carrier, cycle the lever, then examine it and the suspect areas. If there's been any transfer of the indicator, lightly stone and mildly polish them away. Mark Wiggins As for the S&W, check with the factory for a still-larger bushing.

We doubt that red thread locker, stubborn as it may be, will not be strong enough since the bushing may be a press fit. In that case, the gun will have to be returned to S&W since the frame itself is involved with installation of anew bushing and recertification of its proper function with pressure loads.

Brownells At SHOT I'd sure like to send along my sincere thanks for mentioning our new twenty-round .308 magazines and our new Edge program in your article, "SHOT 2015" in the March 2015 issue of American Gunsmith. Thank you! Going to SHOT is always an exciting experience. Where else can a gun person see so much and rub elbows with others who truly love our way of life? You've done a fine job of telling folks about the latest and greatest at the show this year. Well done! Thanks again for writing about us.

It's very much appreciated. Frank R. Brownell, III
Chairman, Brownells.com As always, you're welcome. Thanks for reading! Mossberg Have you ever heard of the rim of shotgun shell cutting a ridge in the top of the receiver, as if the brass on the shotshell is stronger than the steel of the receiver. Verlin Weaver Mountain Man Gun Works Never heard of brass being tougher than steel. Are you certain the bolt isn't slamming into the receiver for some unknown reason?

Might be a good idea to contact Mossberg about the problem. Since the receiver is involved the gun should be returned for factory service. It may still be under warranty. AG

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